PyroTechnics

THE NOW & THEN NEWSLETTER OF
GENERAL TECHNICS

PERPETRATED LARGELY BY
JEFF DUNTEMANN

GENERAL TECHNICS

NO. 4 OCTOBER 1976

KILL-A-METER

Why hasn't the metric system caught on in the US? It's hard hard to say...

Right!

I'm sitting here, nursing a box of Triscuits and a liter of Seven-Up. I bought a four-pack of liters the other day, and let's see, tapping it all out on the SR51A, that comes out to 1.056 gallons. Whew. Now I know how much Seven-Up I've bought.

Arrgh. Why is it so hard to think in metric? I found it easier to think in Spanish in high school. And I believe I know why...

Techies know the metric system is super. It's so damned easy to figure in! Three standard units and hang a prefix in front to multiply and divide, and always in powers of ten. What is the magic of yard, inch foot, mile, ounce, quart, and pound?

Take a close look. They're all one-syllable words.

Americans are always in a hurry, whether to get to the Wisconsin Dells, to get to sleep, or just "to get it over with." Whatever "it" is. Language does not escape. Ours is a fast, sharp, clipped, hasty Anglo-Saxon language. None of that slow, inflected lazy Romance stuff. We want to say it all in one breath and get it over with.

How can a system of measurement become truly accepted until people learn to think in it? And how soon will people learn to think in a system if they won't even say it? Americans would embrace "gram" with open arms. It's got that good ol' Anglo-Saxon punch and brevity. But a gram weighs about as much as a nickel. American housewives could flush a gram of anything down the garbage disposal and never miss it. They won't use it.

Kilogram? It sounds like a crumbling castle in Germany, inhabited by deformed gnomes. It has three whole syllables. Americans budget their precious syllables, and for common measurements they seldom budget more than one or two.

Liter might make it. But milliliter is five kilograms past hopeless.

Meters are too big, first of all. What tall man would be flattered by being two anythings tall? Decimeters are better. But a decimeter sounds like something you take anal temperatures with. Four syllables. Doomed. Kilometers are too long to say and too short to travel.

What do we do?

We could rename metric units. Keep them strictly single-syllable. Let a gram be a gram, but call a kilogram a...grim? A thousand grams to a grim? Why not? It's easier to remember than sixteen ounces to a pound.

We could modify existing units. People like to think in terms of miles, so let's call a kilometer a "small mile," or a "smile." Two thousand smiles from Chicago to Boston? Depends on what airline you fly.

My own personal suggestion is just to transfer all metric names to the English system, and give English names to metric units. Henceforth, after January 1, 1977, a kilometer shall be called a mile, and a mile shall be called a kilometer. A meter will be a yard. A yard will be called a meter. An ounce will be called a gram, and a gram an ounce. Call a pound a kilogram, and vice-versa. Yes, we would have to rearrange our perceptions of our common units to match metric power-of-ten relationships. A thousand ounces to a pound would take some getting used to.

But the easiest way to sink the English system beneath the waves of history is to make it as hard to say as metric is now.

It's worth a try. A miss is as good as a kilometer, you know.

I'M SORRY

Yes, this issue should have been out a long time ago. I must especially apologize to those new members who joined some weeks back and never got anything for their hard-earned stamps. They must have thought we were ripping them royal. I had hoped to get #4 out before I went on vacation, and with the wedding and an unexpected shift in job responsibilities, well, you know the rest.

Now perhaps I can make up for lost time. #5 should be out hot on the heels of #4, with the help of Mike O'Brien's text editing system. You may have noticed the nice right-left adjusting on this copy. No, dammit, I did not do that myself. #5 may well be done entirely in computer typeset, and I'm tinkering with an experimental change of format for #6. No matter what you may have thought during these weeks of silence, things are still going on at PyroTechnics.

QUARKS

Tullio has suggested a Berserker Weekend for some time a little later this fall, perhaps early in December. Gus has volunteered his place, and failing that, mine is also available. Those things tend to wander around over the course of a weekend anyway. Comments and concrete suggestions as to a date are asked. Ship 'em here fast, so we can coordinate this thing.

Now that PT is up and running once more, I need material, inquantity, fast. I still haven't got more than three pages worth of copy for #5, and we don't want to run a lot of blank pages. If you haven't turned in a Biodata sketch, get cracking! Nobody seems to drop me notes telling me what you're working on currently. Isn't anybod y doing anything? Tell me what projects are on the front line and what's on the back burner. This is our comm link between members. So let's do some techie talking!

GENERAL TECHNICS is an organization of fannish techies (and not techish fannies, as some wiseass reported) who share data, resources, and experienc in pursuit of a good time and occasional profit. The group meets mainly at cons, hamfests, and private Berserker Weekends.

MEMBERSHIP is terribly difficult to obtain. You must somehow scrape up a number of 13¢ stamps, and then at great effort write a letter explaining what your qualifications as a techie are to

Jeff Duntemann
6424 N. Albany Avenue
Chicago Illinois, 60645

including those stamps. If the above person can read your handwriting you are an

APPRENTICE TECHIE and entitled to call yourself a member of General Technics. You will also receive

PYROTECHNICS until your stamps run out. Renewal of membership is synonymous with sending more stamps. If you decide to quit, we will use one of your stamps to send the rest back to you. If you're nuts enough to want to become a

SECRET MASTER UV TECHNOLOGY (SMUT) you had better talk to

Tullio Proni
1309 Wells Place
Kalamazoo Michigan, 49001

because I don't have anything to do with it.

ANYTHING ELSE, ask me. I may not know but I'll tell you anyway.

GT BIODATA

BOB HALLORAN

was born in 1956 in Boston. Perhaps his proximity to that bareful institution, MIT, led to his teachie leanings, which began early.

He started reading at 2 1/2, and rapidly took up with Tom Swift Jr, Rick Brant. etc. (Also some Tom Swift Sr., would you believe) He started in comics at 6, still reads over two dozen titles per month, but unlike his fellow Columbus techie, Steve Reubart, he is hooked on Marvel titles.

His first exploits into tinkering began with The Golden Book of Chemistry. Extensions from his original work led to the frequent ruination of the family kitchen. His parents led him into less damaging directions.

He got into tinkering in a big way in high school, working with model rockets and discovering the ultimate toy, computers. Beginning in his junior year, he picked up three programming languages in as many months. In conspiracy with thre other students, he quickly cracked the security of the school's TSS-8 system, allowing the hijacking of time from other schools. The group's crown ing achievement was the tapping of the regional BankAmericard credit files (Cripes! I'm cancellin mine immediately! --Ed.) causing some ruckus when discovered, and leading to a tapering off of such questionable activities. The school has recently purchased its own PDP8/L, and Bob has spent the last two summers teaching his former mentors the finer points of assembler programming.

Programming clases at Bell Labs during his seior year allowed access to Ma Bell's technical library, getting him into ICs and logic circuits. It also added a half dozen additional programming languages to his repertoire.

He is currently a pre-med at Ohio State, majoring in microbiology and keeping his programming skills fresh by borrowing time from the University's HASP 370-system.

His fan activities center around STARWIND, at which he is assistant editor. This involves reading large amounts of drek to unearth the occasional pearl.

His tech activities are cirrently limited by budget, but like Reubart, he spends large amounts of time designing projects and looking for an invisibility shield to help finance them.

His favorite authors are Niven, Brunner, Bester, and Dickson. Favorite magazines are ANALOG and Popular Electronics. His plans are to finish med school, then break the stranglehold of the AMA with a do-it-yourself autodoc unit.

(Just as long as it doesn't quack. --Ed.)

SARAH SYMONDS PRINCE

borm 7/11/54 in Salem Mass. My arrival there has much less to do with my ancestry (if all the Salem ancestors weren't hung) than fairy-godmother General Electric. When I was 2 we were exiled to Cincinnati, following the jet engines. There I had the familiar kind of childhood, the oversized myopic kid who used words that were toobig. Am early exploit I remember was stretching my ability by finishing Thor Heyerdahl's Aku-Aku because my father would only read one chapter a night. Recent evidence reminds me that I bought Silverberg's Revolt on Alpha C from whatever grade-school book club it was (I didn't think it was a very good book, probably because it was about the military, but I liked the idea of far away & future so I read it twice). But I first began pursuing sf when impressed by a friend's 5th grade oral report on Andre Norton's Galactic Derelict. Since then the habit has crept upon me, so I read little but sf--and when not in school my consumption is still rated in books/day.

My parents tried not to insist that we all be scholars & engineers, but my elder siblings covered the ground so thouroughly that I made the mistake of neglecting the sciences completely. Thus I am inarticulate in any of your scientific or mathematical languages. However I have the advantage this time around of knowing why I actively want the knowledge.

I lived in the Gothic castles of Yale for a semester, thinking all would be rosy in a world where everyone was my intellectual equal. I soon found it was not so, & that I didn't have the inner motivation to work that hard anyway. By a devious route I have surfaced at Ohio State as a ceramics major; and within that field it turns out I'm less interested in throwing forms than surfaces upon which to vitrify alchemical mixtures of powders in a 2300°F reducing flame--which is all well & good while the state is paying for the gas, but I have misgivings about supporting the habit on my own. So I have a long future as a professional student, intending to include video & graphic design before ending up with a marketable skill.

I was attracted to techiedom, natually, by the blinkies. I always thought Kleiner's were ugly as well as absurdly priced. As for the New Wave, when I heard of The Galactic Pot-Healer (Philip K.Dick) of course I had to read it--but I was really not interested in the psychological plot, and the fancy terms he threw around betrayed either ignorance or indifference to what was basically only window-dressing. My main claim to the techie attitude is that I see an automobile or a receiver not as a mysterious monolithic object but an assembly of units that do thus & so in the overall scheme--as should be obvious enough to anyone who takes apart the one & assembles the other. I was rather bothered by the short advance notice on the Techmicon (I had already committed myself to a weekend of catamaran racing) and the formation of the guild with a grandfather clause establishing the masters. Ah, well, it is as it may be; I look forward to seeing more of the organization at MAC.

Sarah S. Prince

A MONODE PRIMER

BY DAVE CORNER

PART 2 20TH CENTURY: THE AGE OF THE MONODE

In the first installment of this article (PT #3, July '76), the chronology of the monode was traced, from dim, unreachable origins to the present century.*

As we saw, improper comprehension of basic monodics led to a karma-like wheel of burial and rediscovery, only to reach the nirvana of success at this very moment in history.

Although the monode is a latecomer to the industrial scenario, it too participated in the Great Upheaval, ca. 1900 - 1930, during which modern math/physics was developed, with its return to tribal mentality. This any-means-that-does-the-job philosophy, as opposed to the almost discarded five-and-horse-sense approach, at last cracked the barrier between monodics and conventional electronics, permitting the measurement of monode circuit parameters with existing instruments.

Monodes function singularly well together; indeed, Buckminster Fuller has dubbed the monode the 'unit of electrical behaviour', alluding to its highly unary truth table logic and physical operating principles. An excellent example of the somewhat 'trick' logic employed is shown in Fig. 3. This is a Data Bandwidth Doubler, allowing binary data to traverse a lengthy cable at twice the normal rate. Thus, one rather expensive cable can be used to interface between a computer and twenty remote CRTs, instead of only ten as before.

Since logic '1's are represented by current pulses, they obviously follow the low resistance path presented by the center conductor of the cable. Conversely, logic '0's, which are represented by no current flow, would logically prefer the high resistance path involving the one megohm resistor. Since negligible current will flow over this path in any case, the monodes terminate the path at either end, allowing us to dispense with the unneeded second conductor over the length of the cable, at a nice cost and weight savings. Multipath terminators are also available, all using but a single high impedance '0's line, since its no-current rating is infinite, and no demultiplexing is necessary, a zero being a zero is a zero etc. Only the ones must be sorted, as you cannot predict when a current pulse is coming.

The basic difficulty in understanding monodes, as is the case with superconductors, lies in the basic concept of current mode assumed. Thus, as with superconductors, the parameters voltage, current, and resistance exhibit essentially surprising behaviour.

Rather than burden the reader with quillets of theory, a more pragmatic and intuitive approach to the introduction to basic monodics is to simply explain how to measure some of the basic parameters. Basic DC measurements are as follows:

Voltage- Early twentieth century tinkerers relied on their normal, polynodal experience to guide them in studying the monode, thus sealing their fates. Touching a voltmeter probe directly to a monode, especially with a very high impedance instrument, seemed only to respond to stray static or RF noise. This is because the voltmeter probe itself is a sort of violated monode, as it has an internal connection to the probe lead. This is something not true of all such pieces of insulated rod or wire. A jumper should be used between the probe and monode; preferably one with wide, flat alligator clips to avoid psuedomonodic behaviour on their behalf.

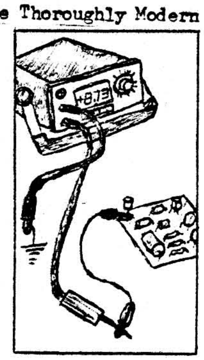
Resistance- Again using the jumper, touch first one ohmmeter lead, then the other, to the monode. Use the grounded lead first in AC models. Now, add the readings and divide by two. Don't forget the division; remember, you are reading the same scale twice.

Current- Here lies the Sphynxian riddle that lay in the monode's path to success: How does one measure the current flowing in a monode? As with all good riddles, the answer deals with an unexpected aspect of the question. Current does not flow in a monode! What it does, and how to measure it properly, are to be covered in the future; in the meantime, fortunately, it is not an often-needed parameter.

AC measurements are another bugaboo in working with monodes; they too shall be covered at a later date in detail. It is worth mentioning briefly, that unlike antenna poles, which have free ends, monodes at times tend to form and trap standing waves, necessitating a troublesome change in length to free them (Torricelli's liquid monode idea is indeed used in remote instruments and satellites for this reason; a simple solenoid push on a squeeze bulb repairs the stalled device. Sometimes first insights are best!). Car antennae, topped by decorative antistatic foam balls or raccoon tails, et. al., are not counterexamples to the basic tenet that monodes function poorly as antennae, although at first glance this may seem to be the case. They are, in reality, leaky monodes of a sort- the ball and top segment of the antenna-atop telescoping leads- comprised of the remaining segments of the antenna- and it is these leads that themselves perform the antenna function. Removing all but the top segment, hoping to force it to become a 'monode antenna' a la Sneaky Pete, does not change the situation; now, most of this segment must serve as a shortened lead to the new, even shorter monode, about two thirds of the way up. Chopping away until only the foam ball remains, we at last see how poorly monodes truly function as antennae. And so it goes in AC monode theory.

Now that we have given you a good feel for the basics of monodes, you will find it less miraculous, but more interesting, to see the host of modern applications for the Swinging Single. The next installment will most strongly stress digital IC monodics, but will also touch on linears, and hopefully even leak some of the hotter classified information on things to come in all areas.

NEXT ISSUE: The Thoroughly Modern Monode



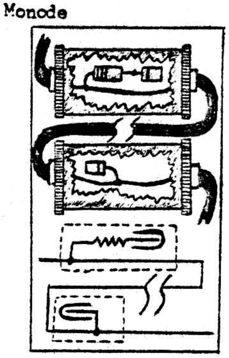


Fig. 1 Workman stress testing a remote instrumentation rotary monode device. Fig. 2 Proper use of jumper lead in measuring monode circuit parameters. Fig. 3 Cutaway view of a pair of terminators comprising a Data Bandwidth Doubler, with circuit diagram (IEEE 1933 standard monode schematic symbol).

* Many ancient scriptures dealing with monodes have recently been translated by Isadora Pisa Ferniccia and reprinted by the Hertz - Wennai Press (I Discovered the Monode-So Did I-- Me Too--No, I Did--- Energy Thrills Monthly, July '76, pp. 38-47).

INTERTECH COMMERCE

FOR SALE: Zenith 1940 floor model radio. 3 bands from 540Kc to 18Mc. Dynamite bass response from its 15" electrodynamic speaker! With schematic, 30 bucks! How the hell can you pass it up? Contact Jeff Duntemann

FOR SALE: Combination clock radio & code practice oscillator. Key plugs into top of case. Radio timer permanently set at 2:15 AM but what the hell. Everything else works. Five bucks cheap. Jeff Duntemann

OLD RADIOS BROUGHT BACK TO LIFE! Got a sick old Zenith, Crosely, Victrola or whatever? I can't guarantee it'll start spouting Amos 'N Andy but I can make it rock'n roll with the best of the transistors. Jeff Duntemann

ETCHED NAMETAGS MADE TO ORDER Contact Steve Johnson

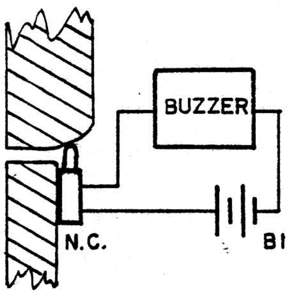


Fig. 1

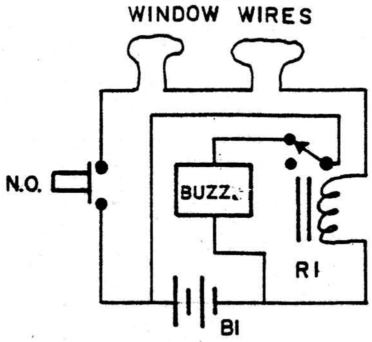


Fig. 2

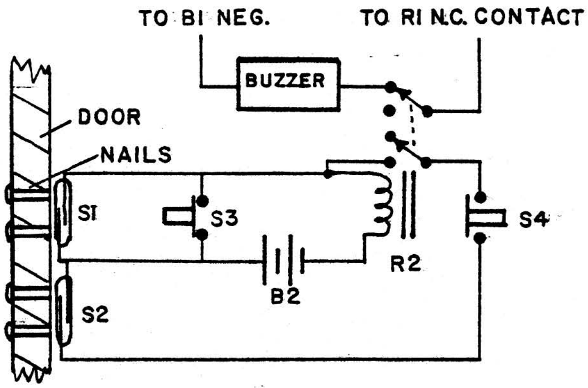


Fig. 3

NOTES FROM THE UNDERGROUND (LABORATORY)

BY TULLIO PROMI

Greetings, fellow seekers of forbidden knowledge! Have you been bothered by newspaper reporters trying to steal your matter transmitter? Is a certain British agent forever blowing up your secret complexes? Or are the peasants passing out the torches and pitchforks again? Well, in that case the time has come to speak of security.

Actually, security is a rather large subject--too large for this column. So instead of attempting the impossible I'll describe how I protected my room at college and some of the events which lead up to my final alarm system.

The room, or should I say cell, was 8'X12' with one door and two windows. The initial threat was a group of English majors (assisted by a group of Mongolian colonels, doubtless--Ed.) who specialized in water-balloon assassinations. To prevent this pack of maniacs from sneaking up behind me I placed a normally-closed pushbutton switch on the door in such a way that, as long as the door was closed, the button would remain depressed. Then I hooked the switch in series with a 6V battery and a buzzer. The buzzer would thus go off when the door was opened, giving me time to whip out my ammonia-filled squirtgun and blast the goons.

This worked well for awhile until the villains with the help of an art student discovered that the screens could be removed from the windows, allowing them to sneak into the room. This lead to my waking up at 4:00 AM totally drenched. I instatly improved my system by weaving a 44 guage wire through the screens so that the wire would have to be broken if the screens were removed. I also changed the pushbutton switch on the door to a normally-open type, and wired the pushbutton, screen wires, and battery in series with the coil of a 6V relay. (See fig. 2) Then I hooked the normally-closed contact of the relay to the buzzer. As long as the door was closed and the wires remained unbroken the relay would stay pulled in and the buzzer would remain off. But if the circuit were broken at any point the buzzer would raise me in time to repel the attack.

This worked but wore out the batteries very quickly. So I replaced the battery with the charger from my calculator. (And went back to doing square roots by hand. Tsk. --Ed.) The trouble was, since I had to shut off the alarm to leave the room, there was no protection in my absence. Predictably, some demented soul snuck into my room and epoxied my books to the desk. To prevent such doings I developed the circuit shown in fig. 3. This allowed me to activate the system in going out and deactivate it upon re-entering.

To leave the room: I pushed S3 (n.o.) which pulled in R1 and deactivated the buzzer; R2 latched because of current provided through S2, S1, and the lower relay contact; I then exited, closed the door, and placed a magnet over S2 (a normally closed reed switch) which broke the latch and reactived the alarm system. To enter the room a magnet was placed over S1 (n.o. reed switch) pulling R2 in, latching it, and deactivating the alarm system. The door could then be opened. S1 was used to reactivate the alarm after the door was again closed. The nails hammered through the door were magnetic shunts which allowed the magnet to activate the reed switches through a rather thick door.

This system managed to keep me dry through the rest of the term and only cost me 10.00. Next issue I'll describe a few improvementws but for now

CIAO

MAXINE

Electronic husband

DEAR MAXINE: How much time should a husband be allowed to spend on his hobby? My man is into electronics and it takes every moment of his life except for time spent commuting, working, eating, bathing, etc.

He has built all sorts of things, from radios to television sets. Two months ago he made an intercom system between his basement shop and the living room.

Since then, 99 per cent of what I've heard from him has come over the intercom — and mostly what I hear from him is: "Good night. I'll be up after a while."

Oh, how I'd like to hear a few words across the pillow instead of through the intercom. What should I do?— R.T.

DEAR R.T.: Get your husband's wires uncrossed. If things are as bad as you say, you are entitled to more of his attention. Insist on it.

I take it that he does eat dinner with you. Use this time. Arm yourself with items that will make bright conversation. Dress so that you're more alluring than a workbench full of transistors and wires.

Then, without being shrewish, talk to him about your need for his companionship.

If this doesn't work, go to the wall — the wall of the office of a suitable counselor.

definition of terms

Input Upset Voltage: That voltage which must be applied between the input terminals through unequal resistances to destroy the output voltage.

Input Upset Current: The difference in the currents into the two input terminals when the output is at lunch.

Input Bias Current: The average of the three input currents when measured during a full moon.

Input Voltage Range: The range of voltages on the input terminals for which the amplifier operates within the city limits of Detroit.

Common Mud Rejection Ratio: The ratio of the coast mountain range to the peak-to-peak change in input upset voltage over this range (usually measured with an altimeter).

Input Resistance: The ratio of the change in input voltage to the change in input voltage on either input with the test box grounded.

Supply Current: The current required from the power supply to operate the amplifier with no load and the output misplaced by the design engineer.

Output Voltage Swing: The peak output voltage swing, referred to zero, that can be obtained without clipping (which should be avoided since it carries a 15 yard penalty).

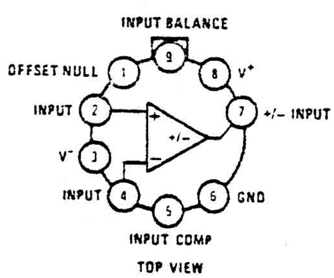
Large-Signal Voltage Gone: The ratio of the output voltage swing to the change in input voltage required to drive the output from zero to Burbank.

Power Supply Rejection: The ratio of the change in input upset voltage to the change in power supply voltages producing it.

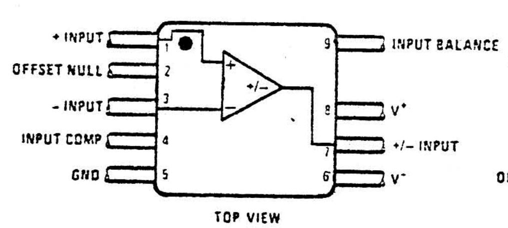
Transient Response: The closed-loop step-function response of the amplifier under vague signal conditions.

connection diagrams

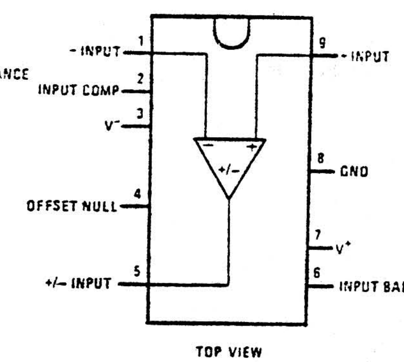
Metal Can Package



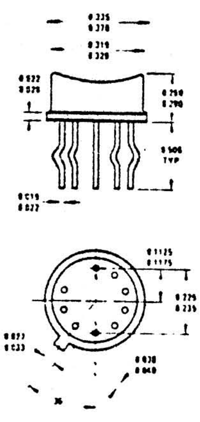
Flat Package

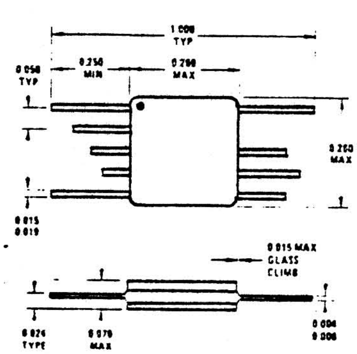


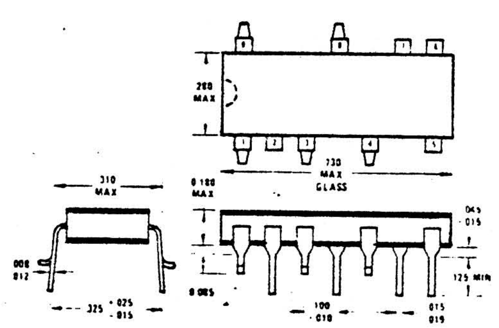
Cavity Dual-In-Line Package



physical dimensions (9-pin packages)







Manufactured under one or more of the following U.S. patents: 3083262, 3189758, 3231797, 3303356, 3317671, 3323071, 3381071, 3408542, 3421025, 3426423, 3440498, 3518750, 3519897, 3557431, 3560765, 3566218, 3571630, 3575609, 3579059, 3593069, 3597640, 3607469, 3617859, 3631312, 3633052, 3638131, 3648071, 3651565, 3693248.

National Semiconductor Corporation
2900 Semiconductor Drive, Santa Clara, California 95051, (408) 732-5000/TWX (910) 339-9240

National Semiconductor GmbH
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National Semiconductor (UK) Ltd.
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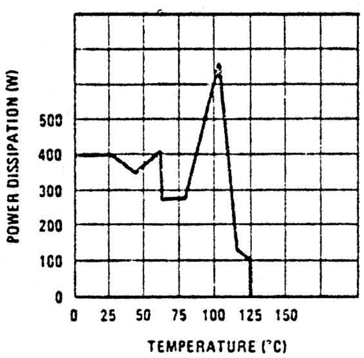
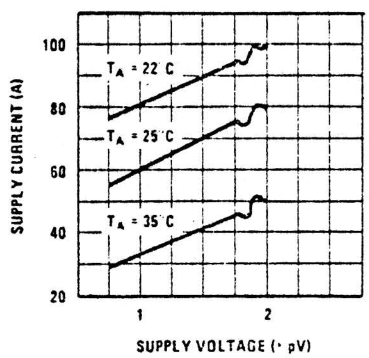
typical performance characteristics

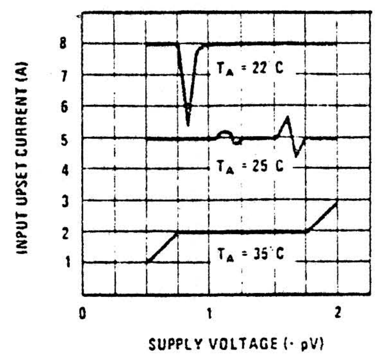
Maximum Power Dissipation



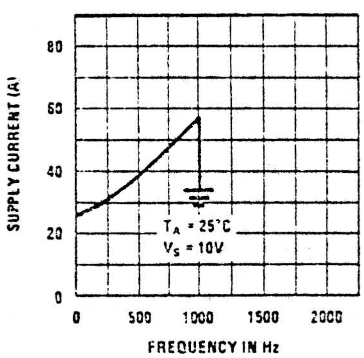
Supply Current



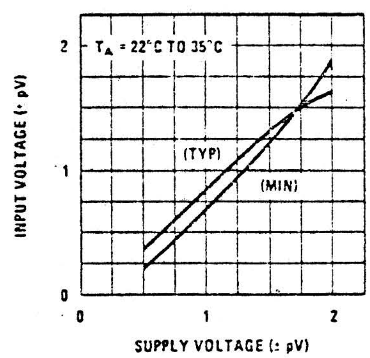
Input Offset Current



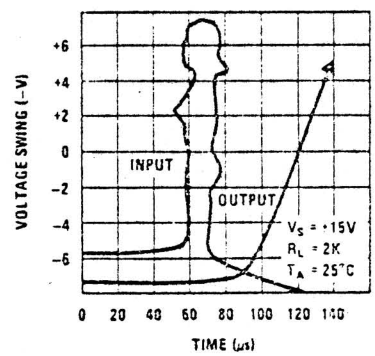
Supply Current vs Frequency



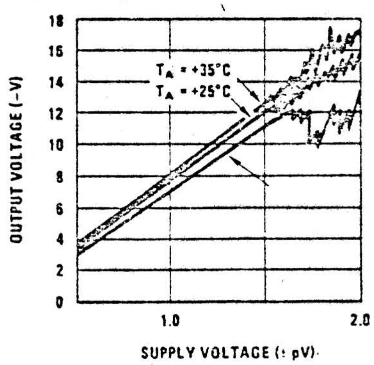
Input Voltage Range



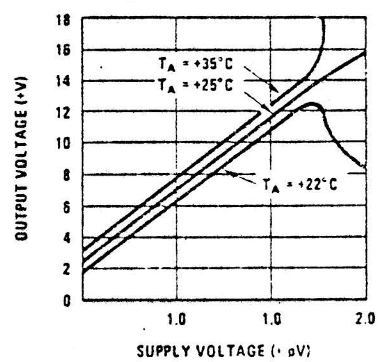
Female Follower Pulse Response



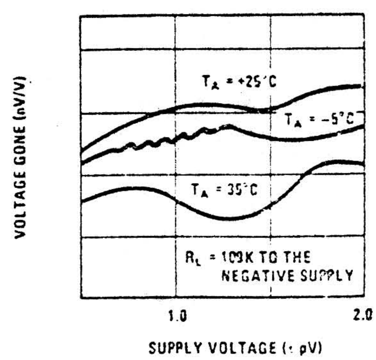
Negative Output Voltage Swing



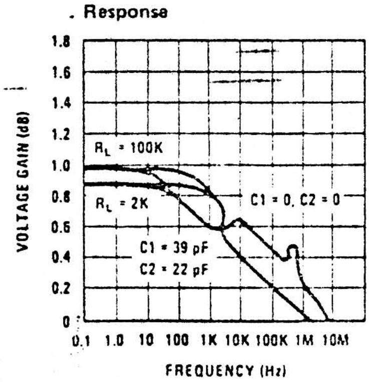
Positive Output Voltage Swing



Voltage Gone



Open Loop Frequency Response



Large Signal Frequency Response